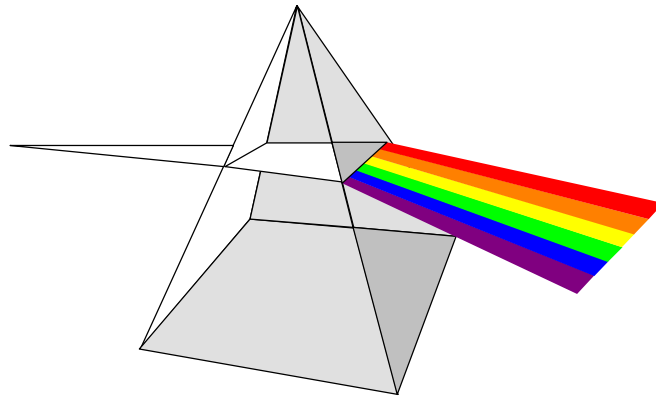


# EM TECHNOLOGY DEVELOPMENT AND DEPLOYMENT - FETC PERSPECTIVE

by  
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## Introduction

Good morning! Welcome to the Federal Energy Technology Center (FETC) and to West Virginia. We tried to keep the leaves on the trees for your visit today. I am particularly pleased that Jim Owendoff and Gerald Boyd were able to join us today.

It is no secret that this has been a rough year for the entire Environmental Management (EM) program and especially for the Office of Science and Technology (EM-50) program. For those in the audience who don't follow the energy rag sheets, last spring, the House Oversight Committee held a hearing on the EM-50 program. The Oversight Committee pointed out that the EM-50 program has spent more than \$2 billion on technology development since 1989. The House Committee asked us, the Department of Energy (DOE), to provide qualitative evidence that the \$2 billion investment has reduced the mortgage to cleanup DOE sites. The Committee asked us why we had not deployed more of the technologies we had paid to develop. And they threw in a few "when did you stop kicking your dog" questions.

I would just as soon forget the hearing. But it did make us in the Department ponder the big issues in technology development (TD):

- What are we doing in technology development?
- How can we do it better?
- How can we more accurately measure and document our successes?
- How can we better communicate our successes to Congress and other stakeholders?

In my talk this morning, I want to leave you with three conclusions — three messages — that I believe came out of these deliberations.

### **Message 1. EM needs to continue to have a DOE-funded technology development program.**

A DOE-funded, *technology development program* is needed for several reasons:

- Many technologies are in late-stage development. You will hear about several of these during this conference. DOE can deploy them in time to reduce cleanup mortgages in the 2006 plan.
- We need to address cleanup issues for the post 2006 period.

- Many promising cleanup technologies already exist in the private sector, either as off-the-shelf, or nearly off-the-shelf technologies. A technology development program is the most expeditious way to get these promising technologies demonstrated at DOE sites.
  - Demonstrations increase the number of potential bidders on DOE projects.
  - Demonstrations increase the comfort level of the problem holders within DOE.
  - Demonstrations reduce the contingency vendors must charge DOE when they bid on future cleanup jobs. In the demo, the vendors learn how to do business with DOE.

All this adds up to a reduced cleanup mortgage.

- The private sector will not fund technology development for the DOE market on its own. Granted, the potential market for cleanup technologies is large. But, in spite of this large market, there is too much risk for the private sector to fund technology development *entirely* on their own. The risk is in the timing and the requirements of the DOE market.

## **Message 2. An EM-50 program with its centralized coordination and funding of the technology development program still makes sense.**

Let's look at possible models for managing technology development for EM. (Much of this is from the business literature, but I've put it into the DOE/EM context.) One possible model is *dispersed* R&D management. In the DOE context, each site would identify its own TD problems and then use technical support at that site to solve those problems. Site A has problems B & C, does the TD at the site to produce solutions, and then implements the solution(s). Similarly with site D and site G. Under this model, each DOE site operates in isolation from the other sites.

When Problem C crops up at two sites, there is no inter-site communications to identify it as a common problem. Thus, the two sites independently develop and implement solutions.

The *dispersed* R&D model has three positive characteristics:

- The TD team is closely linked with the problem holder.
  - **Planning link** — the TD can easily observe the site's problem sets.
  - **Funding link** — the TD teams budget can be dependent on meeting the needs of the problem holder.
  - **Implementation link** — the problem holder has some commitment to implement the results of the TD team.

- Regional stakeholders and the regional environmental community can get involved during the TD phase.
- We avoid the overhead of a central research organization.

The negative aspects of the dispersed R&D model are:

- Duplication of related efforts — which is expensive.
- Less “out of the box thinking” — a site may not have the breadth of expertise or the critical mass to carry out effective, full spectrum research.
- Near-term issues can be over emphasized--the crisis of the day--because of the close coupling between the problem holders and researchers.
- Little incentive to involve universities.
- Little incentive to involve private sector developers. This is a missed opportunity to establish a strong U.S. private-sector environmental industry to serve the DOE market, the Department of Defense (DOD) market, and the domestic and international civilian markets.

The second possible model is ***Central R&D Management***. All DOE sites identify their problem sets and communicate this information to a **central technical support** site. This central site performs the TD, and then transmits solutions back to the individual sites. The advantages of the ***central R&D management*** model are:

- Duplication of R&D effort is eliminated.
- Critical mass of technical expertise is more easily maintained.
- It is easy to maintain a balance between short term and long term TD.
- TD results are evaluated consistently.
- Corporate goals are uniformly applied in selecting which TD areas to pursue.

The downside of the ***central R&D management*** model is that the Central lab:

- Lacks first-hand knowledge of the problems at the individual sites.
- Lacks interactions with regional stakeholder and regulators.

- Can be divorced from the corporate strategic planning of the line programs.
- Can be less responsive to needs of the individual sites.

I was not party to the conversations in the Forestal building in 1989 when DOE established environmental management as a DOE mission. But I suspect that the DOE management at that time recognized:

- That a TD program was absolute necessary to reduce the cost and risk of cleaning up DOE's sites and to provide solution to intractable problems.
- That a **pure** dispersed R&D model would not meet DOE needs. There are too many commonalities of R&D needs.
- That a **pure** Central R&D model would also not meet DOE's needs. The political forces would not allow all the R&D to be shipped off to one DOE site.

I believe DOE made the correct decision in 1989 when they established EM-50, the Office of Science and Technology, as a hybrid R&D model — a model that contains aspects of both the central and dispersed R&D models. That has been the experience of major corporations in the private sector. Up through the 1980s, General Electric, Exxon, and Texaco all followed the centralized model. These corporations did all their R&D in the corporate laboratory. But in recent years, they have migrated to a hybrid R&D model.

In 1989, the hybrid model made EM-50, EM's corporate manager and funding authority for TD for problems common to multiple sites. The TD itself was assigned to whoever had the greatest expertise to do it, be they laboratories at the sites, private sector organizations, or universities.

Many cleanup problems are common to multiple sites. For example:

- Characterization techniques
- Exhuming and treating buried wastes
- Decontamination and decommissioning
- Containment / transportation issues

All these benefit from central management coordination. The broader perspective of central management develops better technologies — faster, safer, cheaper — that are applicable across many sites. Violations of the central management philosophy have been an embarrassment to DOE, and provided a field day for our critics. The GAO pointed this out very clearly to DOE in 1996 when they correctly reported that we were paying to develop more than 60 different thermal processes to treat mixed low-level wastes. No agency has the funds to develop and deploy 60 different thermal treatment systems!

Over the years, the hybrid management structure in EM-50 has evolved to meet the needs of DOE:

- Technology development efforts were grouped by topic into focus areas and into crosscutting programs. Responsibility for managing each of these was assigned to a specific DOE office.
- Site Technology Coordinating Groups (STCGs) were established at each site to communicate the needs for technology development to the EM-50 organization.
- And recently, EM established a *Technology Acceleration Committee* consisting of the managers of the DOE sites and at HQ — the managers of the line programs and the manager of OST, Gerald Boyd. The committee is charged with expediting the deployment of innovative technologies across the DOE complex.

The bottom line of all this is — the model for the management of the technology development program that was selected in 1989 is still a rational model. It makes sense to have a central **coordination and funding organization** for problem sets common to multiple sites.

### **Message 3. FETC has developed a rational strategy to manage the Industry Program.**

This strategy does produce innovative technologies. It gets them demonstrated on DOE sites. It gets them deployed. It reduces the mortgage. There are eight steps in this strategy. **Many** organizations besides FETC have a role in this effort.

1. Determine and prioritize technology needs. The problem holders at DOE sites define the needs through the 2006 Plan and through the Site Technology Coordinating Groups. The Focus Areas and Crosscutting Programs roll up the needs across the DOE complex.
2. Determine if off-the-shelf technology, or commercial capability, is available to meet those needs. Much of this responsibility lies with the Focus Areas.
3. If existing technology is **not** available, define the performance requirements for technology development. Requirements include cost, schedule, technical performance, and acceptance criteria. The Focus Areas, Crosscutting Programs, **and** STCGs all participate in this effort.
4. Craft a technology development strategy that meets these performance requirements. FETC seeks ideas from the business community — financial organizations, integrating contractors, and technology vendors. We also work to obtain buy-in from the Environmental Protection Agency (EPA), state regulatory organizations, and stake-

holders. We seek cost-sharing from the private sector and other Government agencies (DOD and EPA) to leverage DOE's investment.

5. Produce a cleanup product — not a technology. Generally, FETC contracts with private sector companies for technology development. We believe private sector involvement is critically important. These are the organizations that will eventually deploy technologies under many of the potential future contracting scenarios that DOE might employ — including privatization or integration contractor scenarios.
6. Position private-sector organizations to offer products to the DOE market under commercial terms and conditions. Technology vendors, particularly small businesses, frequently need to be teamed with managerial, financial, or marketing organizations. These vendors, and DOE, also need to address stakeholder and regulatory acceptance issues at this stage.
7. Increase the problem holders confidence that the cleanup product will **meet or exceed** performance requirements. Frequently, this involves a side-by-side demonstration of the innovative and the baseline technology.
8. Measure performance and cost, document it, and report on program successes.

FETC implements this strategy using technically-trained federal employees. We do not have a site to clean up nor do we develop competing, remediation technologies. Thus, we can serve as a true honest broker!

While FETC's focus is on industry solutions to DOE cleanup problems, we recognize that the national laboratories, universities, and other organizations have much to contribute. We rely on the university community to provide private-sector developers with fundamental research, applied engineering studies, and technical support. Many of these universities are here today: In alphabetical order: Florida International, Florida State, Mississippi State, North Dakota, and West Virginia University.

Through the International Union of Operating Engineers, we assist private sector developers with worker health and safety issues. Through the Global Environmental Technology Enterprise, we assist in overcoming commercialization and market barriers.

How well is this system working? The scorecard on the Industry Program is impressive! Since the program began in 1992, 86 projects have been funded; of those, 38 have been completed. Twenty of the completed projects were terminated in the early stages of development, before costly field testing occurred. This indicates we manage the programs well. Built-in decision points let us cancel projects that are not meeting expectations. Eighteen of the completed projects, **did** proceed through field testing, and 12 have already been deployed within the DOE complex. This success rate **far exceeds** private-sector experience in commercializing

technologies from their R&D laboratories. Of the 48 active projects, two have already been deployed at DOE sites, and 14 more have matured to the point that we expect them to be deployed next year.

We conservatively estimate that widespread use of these innovative technologies could save \$1.5 billion. That represents an 8:1 return on the Government's investment of \$186 million in the Industry Program.

## **Conclusion**

In closing, I would like to reiterate that I'm proud of FETC's track record in the Industry Programs. We consider our achievements with you to be a significant contribution to the Nation's environmental cleanup objectives. The technologies that we develop have a scattering effect when deployed. You might compare it to a single shaft of light that hits a prism: at the other side, the light is transformed, dispersed, and provides a rainbow of light to a much larger area. That's the impact that our efforts will have on the environmental remediation industry. We have enjoyed working alongside you on past and current projects, we are delighted that you are here, and we look forward to continuing doing business together. Thank you.